



## Curiosity Guide #302

### Sound Resonance

Accompanies Curious Crew, Season 3, Episode 2 (#302)

#### Cuica (kwee-ca) Can

Investigation #6

#### Description

Make an unusual musical instrument and learn more about how sound works.

#### Materials

- Empty coffee can with lid
- Can opener
- Wooden skewer
- Duct tape
- Scissors
- String
- Finishing nail (a nail with a small head)
- Hot glue
- Fabric cotton scrap
- Cup of water

#### Procedure

- 1) Using the can opener, cut out and discard the metal base from the coffee can.
- 2) Cover the sharp remaining edge with a strip of duct tape.
- 3) Poke a small nail hole in the center of the plastic lid.
- 4) Poke the skewer up through the plastic lid and trim the sharp point off with scissors. The skewer should stick up one-half inch above the top of the can.

- 5) Cut two short lengths of string. Tie a knot around the skewer, both above and below the lid.
- 6) Add hot glue to each knot to keep the stick in place.
- 7) Dip the cloth in the container of water. Squeeze out the excess so that the cloth is damp.
- 8) Slide the cloth on the wood skewer at different speeds.
- 9) What sounds can you produce?
- 10) What happens if you lay a finger on the lid while pulling the cloth?

## My Results

## Explanation

Cuicas are originally African instruments, but Brazilians also play them during Carnival. Sound is produced when things vibrate, and in this example, the sound vibrations come from the motion on the stick and the contact with the lid. The hollow air chamber in the open can allows the sound waves to vibrate the air there. When the vibrations on the instrument continue, they can match with the waves in the air, build, and amplify the sound. This is called resonance.

Every object has the potential to vibrate, from air molecules to the earth itself, and those vibrations occur in different wave patterns, or natural frequencies. In the case of musical instruments, when a vibration occurs with its natural frequency, harmonic sound is produced. By adding an additional force with a matching frequency, the wave increases in amplitude and a louder sound is produced.

**Something else to explore:** Try making smaller cuicas. What do you notice about the different pitches?

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